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North American Plantaginaceae — III *

E. L. Morris

An earlier publication requires the putting on record of

Plantago xerodea nom. nov.

Plantago picta Morris, Bull. Torrey Club **28**: 118. 1901. Not *Plantago picta* Colenso, Trans. New Zeal. Inst. **22**: 481. 1890.

Since the publication of the last paper of this series, the writer has been favored by the opportunity of studying several hundreds of specimens in various herbaria, covering not only the species heretofore treated but others in the different groups under the genus. To this has been added much field work upon some of the species in their natural surroundings.

If we consider Decaisne's treatment of the Plantaginaceae, in DeCandolle's Prodromus, 1852, as the first full and modern treatment, we must consider Asa Gray's treatment of the American species in the Synoptical Flora of North America, 1886, as the first full revision of the group including the then known North American species. Among the perennial plantains there has been little change since 1886 except for the addition of a few new species. Among the annual plantains considerable revision has been made by several authors. So much for the group of species with four stamens, the flowers all perfect and the corolla remaining open and expanded after the stage of anthesis.

For the species with the stamens two or sometimes four, with flowers mainly other than strictly perfect and the corolla mainly, at least in the fertile plants, remaining closed after anthesis, it is necessary that considerable revision be made. The first group of species, here considered, are those narrow-leaved annuals whose flowers at the stage of anthesis are *minute* and quite inconspicuous; and whose treatment by American taxonomists has been quite variable.

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* [North American Plantaginaceae — I =] "A revision of the species of *Plantago* commonly referred to *Plantago patagonica* Jacquin." Bull. Torrey Club **27**: 105–119. 1900.

North American Plantaginaceae — II. Bull. Torrey Club **28**: 112–122. *pl. 12.* 1901.

Plantago elongata Pursh was for many years lost sight of and became almost forgotten. Its nearest relative, *Plantago pusilla* Nuttall, was collected in larger quantities, more often from a wider range, and with such profusion as to swamp the identity of the other species even when recently collected. Pursh described the species as follows:

"*Plantago elongata.* — P. foliis linearibus integerrimis glabris, scapo spicis elongatis subimbricatis foliis longioribus, bracteis ovatis acutis margine membranaceis.

In Upper Louisiana. *Bradbury. v. s. in Herb. Bradbury.* Resembles *P. pauciflora.*"

In 1871, Sereno Watson described a plant which he collected in Salt Lake Valley near the mouth of the Jordan River as *Plantago Bigelovii* A. Gray. He noted it as "resembling *Plantago pusilla*, but with twice larger flowers and fruit, and the capsule (1″ or more in length) more protruded."

In 1883, Engelmann observed a different form from Nuttall's species in plants in his herbarium which had been collected by Geyer on the Nicollet Northwestern Expedition and by Hayden during the survey of Nebraska and the adjacent territories. This form he described under the name *Plantago pusilla*, var. *macrosperma.* His point of emphasis was the measurement of the seeds, and in his herbarium there is extant a sheet containing the following measurement notes:

" 1. St. Louis	1.3 mm.
2. Indian Territory broad-leaved form	1.8 "
3. Nicollet, Shienne River	2.4 "
4. Hayden, Yellowstone	2.4 " "

His diagnosis specifies the "larger form, 4 to 7 inches high, with longer much exsert capsules; seeds nearly twice the length of the last, 2.4 mm. or 1.2 lines long. Saline soil of the Western Plains; on the Shienne [etc.]." Engelmann further states "Dr. Gray thinks that he has proofs that this species [*P. pusilla*], or probably the second form of it [*P. pusilla*, var. *macrosperma*], is the lost *P.*

elongata Pursh, * * * but even if so Nuttall's name, now well known since more than 60 years, ought to be retained in place of a doubtful and very inappropriate one."

Asa Gray in the Synoptical Flora gives, in the synonymy of *P. pusilla* Nuttall, "*Plantago elongata* Pursh proves to be this, a bad name." Asa Gray "received Jany. 1, 1883" a specimen from Engelmann with his handwritten label, as follows:

"Plantago pusilla Nutt.
sem. 4. maximis foveolatis
High Prairies. Fort Union
on Yellowstone
F. V. Hayden 1853–4."

— an evident copy of one of Hayden's labels. Of this specimen, Gray annotated in his own hand on the herbarium sheet, below the label, as follows:

"Received Jany. 1, 1883.
This just answers to, and is
from the district of the
Plantago elongata, Pursh
(seen in Hb. Kew.)
But original of Pursh seems to have
several ovules!"

The expression "seen in Hb. Kew.," quoted above, at first suggested that Dr. Gray may have believed the Kew specimen to be Pursh's type of the species, but the following extract from a memorandum by the Director of the Royal Botanic Gardens, Kew, clearly indicates that this is not the type: "The specimen of Plantago elongata, Pursh, in Kew Herbarium seen by Dr. Asa Gray, was collected by Dr. Taylor at Sepulchre Bluffs, Bradbury. There is no specimen at Kew of any Plantago collected by Pursh. . . . The words 'No. 28, Dr. Taylor, Sepulchre Bluffs, Bradbury' and the name 'Plantago elongata Psh.' are in ink, in the handwriting of Sir William Hooker. But the words '= P. pusilla, *Nutt.*' and the mark of '!' . . . are in pencil, in the handwriting of Dr. Asa Gray."

Later than this treatment of the species, the principle of priority as a *rigid* rule of taxonomic work was renewed; and *Plantago elongata* Pursh was given, by many, the benefit of its publication in 1814 as against the date of 1818 for Nuttall's

Plantago pusilla. This action has been followed, more or less consistently, including the writer's work, since that time. It is evident from herbarium annotations, and synonymy wherever it occurs, that the identity of Pursh's species and Nuttall's species has been taken for granted, thus following Asa Gray.

In 1900, P. A. Rydberg, also without reference to *P. elongata* Pursh, segregated from *Plantago pusilla* Nuttall a northern and western form which he called *Plantago myosuroides.* In his description of the species he cites two of the specimens already referred to, namely, Watson's "*Plantago Bigelovii*" from Utah, and Geyer's material from the upper Missouri. The latter is clearly designated by Engelmann. It is quite evident that Rydberg was without knowledge of Engelmann's publication, for his characterization is remarkably like that by Engelmann. He says "nearest related to *P. pusilla* Nutt., differing in the larger size, larger flowers, the longer capsule which is twice as long as the sepals," etc.

From the foregoing it seems evident that Asa Gray had not finished comparing Pursh's type and other material of the species, and that Engelmann and Rydberg were unfortunate in coming no nearer to the identity of Pursh's type. The type specimen, according to present information, is in the Academy of Natural Sciences of Philadelphia; and when placed beside specimens from Geyer, Hayden, Macoun, and Watson, it is hardly distinguishable from some of them, and is readily recognizable as belonging with them and later collections in distinction from the species occurring mainly east and south of the range of *Plantago elongata.* Engelmann and Rydberg each described characters not noted by Pursh; also, in addition to those quoted, characters not noted by the other; and the combination of Pursh's diagnosis with Engelmann's and Rydberg's makes a nearly complete description of the species.

Plantago elongata occurs, so far as ascertained, only in saline and subsaline localities, and only above the 1000 foot contour. The type locality is determinable from the following, kindly sent by Mr. Stewardson Brown of the Philadelphia Academy: "Regarding locality for Pursh's *Plantago:* in Bradbury's Journal page 335 in a 'Catalogue of some of the more rare and valuable plants discovered in the neighborhood of St. Louis and on the Missouri' he says '*Plantago elongata,* near the Maha Village.' According to the detail part of the Journal this must have been some distance up the Missouri, as the time between March 14 and May 11 was spent in reaching that point; in another place he says, in referring to the distribution of the honey bee, which was not known west of the Mississippi up to 1797, 'They are now found as high up the Missouri as the Maha Nation . . . a distance of 600 miles.'" The name "Maha" in recent bibliographies refers to an Indian tribe now situated in New Mexico. But doubtless Bradbury's use of the name "Maha," among several spellings, was for "Omaha." The location of the Omahas is indicated by the following from Alice C. Fletcher's "Historical sketch of the Omaha tribe of Indians in Nebraska": "The Omaha tribe of Indians live in the State of Nebraska, about 80 miles north of the city of Omaha, on a reservation 12 miles in length north and south, and bound on the east by the Missouri River and on the west by the Sioux City and Omaha Railroad. Of the various tribes living in Nebraska when the white settlers first entered the Territory the Omahas are the only Indians remaining upon their ancient home lands. In the absence of any written records it is almost impossible to fix dates, but it seems probable that the Omahas have dwelt near their present location for the past two centuries or more. Their traditions point to an earlier home in the Ohio valley, whence they were driven by wars; slowly migrating across the Mississippi River, up the Des Moines and its tributaries to their headwaters, thence westward until the Missouri was reached. Crossing this river, the people gradually made their way south to their present place of residence." Edwin James, in the narrative of the Long Expedition, also refers to the location of the "Omawhaws," as follows: "What length of time the Omawhaws have resided on the Missouri is unknown; but it seems highly probable that they were not there when Mr. Bourgmont performed his journey to the Padoucas, in the year 1724, as he makes no mention whatever of them. It would seem, indeed, that they had separated from the great migrating nation . . . on or near the Mississippi, and that they had since passed slowly across the country, or perhaps up the St. Peter's, until they finally struck the Missouri at the mouth of the Sioux River. This is rendered highly probable by the circumstance of Carter having met with them on the St. Peter's in the year 1766, associated with the Shienne and others, all of whom he represents as bands of the Naudowessie nation." C. A. Geyer collected his specimens (*no. 279*) in "arid saline plains valley of Shian River near its mouth (upper Missouri)," now the Cheyenne River, which empties into the Missouri about 35 miles, air line, northwest of Pierre, South Dakota. One of Hayden's specimens of *Plantago elongata* bears the following label:

"FLORA NEBRASKANA
Plantago pusilla Nuttall
Semminibus 4 maximis
High Prairies, Ft. Union.
DR. F. V. HAYDEN, Leg. 1853–4."

A map of Nebraska and Dakota, etc., by Maj. John Warren, Mch. '67, accompanying Final (4th) Report of U. S. Geological Survey of Nebraska, etc. by F. V. Hayden, Washington, 1872, contains location of Ft. Union, Long. 104° west, Lat. 48° north, on the north bank of the Missouri River, about five miles above the mouth of the Yellowstone River. This location is given on the map of 1870. There is no modern use of this name for this location within the information of present day atlases. Pound & Clements, in their "Phytogeography of Nebraska," indicate the limited habitat of the species, when they say of " . . . Xerophytes of high prairies and sand hills. . . . P. elongata, which is confined almost wholly to alkaline situations, seems to exhibit a tendency to become a halophyte."

The limiting of this species accomplishes two fortunate things: It recognizes the applicability of Pursh's name, because of the elongated (more or less interrupted) spikes, and long carinate bracts; second, the retention of the well-known and long-used name published by Nuttall for the species common in the lower Mississippi Valley and its tributaries, and eastward along the Ohio, the Tennessee, the Gulf Coast, and up the Atlantic seaboard to Massachusetts.

Plantago pusilla Nuttall has been well known to all collectors east of the Mississippi and south of the Great Lakes. The name had become almost a "household word" among botanists. This name was retired because of the priority of Pursh's name, during the latter part of the now long period in which the species were constantly confused. The name *pusilla* is applicable in every sense of the word to practically every condition of the species, as commonly found in its sandy or otherwise characteristic habitat. In distinction from it, *Plantago elongata* Pursh is noticeably lank and lean and its strength is most emphasized in the woody character of its tissues, especially the tap root, which is heavy in proportion to the rest of the plant, as is typical for plants in saline localities.

Plantago pusilla Nuttall, 1818, and the less used and often forgotten *Plantago hybrida* Barton, 1818, applied to the same species, may yet be the cause of some nomenclatorial controversy. The writer has tried by every known method to determine the priority of one of these names. Dr. Barnhart * has discussed the question quite fully. And Nuttall's name is here retained as prior on the following " internal evidence ":

Philadelphia, 1818	Nuttall, Gen.	Barton, Comp. Fl. Phila.
Title deposited to secure copyright	April 3, 1818.	July 9, 1818.
Preface dated	May 27, 1818.	July 11, 1818.
Cross references		Preface acknowledgment of Nuttall's kindness in permitting use of Nuttall's work. Text citations to Nuttall's work.
Certified by	D. Caldwell, *Clerk of the District of Pennsylvania.*	D. Caldwell, *Clerk of the District of Pennsylvania.*

Against this, however, is the argument (?) of Otto Kuntze,† for Barton, January 1818. For this, Kuntze gives no basis or reference.

Barton goes to some length to explain his separation of *P. hybrida* from *P. maritima*, by which name he had called it in his Prodromus Florae Philadelphicae, 1815, but *P. hybrida* he now (1818) emphasizes by being " destitute of everything like woolliness at the base," and other distinctive characters.

Plantago pusilla and *P. heterophylla* have been confused by many collectors who failed to consider the seeds, in the forms of the first with slight toothing of the leaves, and in the forms of the latter without such toothing. It is interesting to note that Nuttall so confused them in a collection of his own from Arkansas (not his type), one plant of *P. heterophylla* with entire leaves and 10

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*See his Nomenclatural notes, Bull. Torrey Club **24**: 409. 1897; **26**: 379. 1899.

† Rev. Gen. Pl. 3^2: 160. 1898.

seeds being placed with typical *P. pusilla* with entire leaves and 4 seeds, these being now in the Academy of Natural Sciences of Philadelphia.

Plantago pusilla from the Columbia River and neighboring parts of Washington and Oregon varies somewhat from the eastern forms. It is noteworthy that the earliest record, available at this time, of the species from the Columbia drainage is May, 1887. It seems probable that the plant is here introduced and naturalized. But present data afford no explanation of the method of introduction. Few specimens attain normal dimensions, and the spikes often are but few-flowered.

The species has long been known as far east as Long Island and Connecticut, more recently from Rhode Island, and now, by the careful search of Mr. E. B. Chamberlain, from Massachusetts, at Seekonk, June 13, 1901.

Plantago pusilla Engelmanni (see below, p. 528) was described by Engelmann, in 1883, as a variety *major* of *P. pusilla*, characterized as: "much larger and stouter, leaves lanceolate-linear, often 1 ½ to 2 lines wide, the larger ones laciniate with few long teeth or lobes; scapes densely woolly at base, with the elongated spike often 9 inches high; bracts acute, longer than the sepals; seeds intermediate in size between the two other forms — Near Atoka, north of Red River in the Indian Territory." The size of these seeds is given in the note quoted above (under *P. elongata*) as 1.8 mm. for the "Indian Territory broad-leaved form." Several specimens belonging here are intermediate with *P. pusilla* in the woolliness at the base. The extreme form in this respect is Engelmann's own type. So, this character must be considered as relatively unimportant. This woolliness at the base, together with the laciniate toothing of many of the leaves and the extension of the bracts beyond the calyx, superficially confuse this subspecies with some plants of *P. heterophylla*, but the difference may be at once recognized by the number of seeds and their size and shape, as well as the more rigid habit. This subspecies seems to be limited to Missouri, Arkansas, Indian Territory, and Oklahoma. There is no apparent intergradation with *P. elongata* Pursh, but there is regular intergradation with *P. pusilla* in Missouri and Arkansas, and questionably in Kansas.

Plantago Bigelovii A. Gray requires little discussion. With a range from south central California northward into British Columbia, and only in low valleys and along the seacoast, it is readily distinguished from the other annuals of the genus. In the low valley forms, the habit tends to be slender, with a somewhat tardy maturing of the seeds. In the coastal forms, the habit is pronouncedly stockier, with an early maturity. About the region of San Francisco Bay the two forms strongly intergrade. The type, from Benicia, in the Gray Herbarium, is a depauperate plant. Evidently the remaining Bigelow specimens, if any, were destroyed in drawing the diagnosis in 1857. Additional plants, collected by Dr. E. L. Greene in 1874, were used in the emended description in the "Botany of California" as there cited, and as labeled "Syn. Fl. N. Amer." in the Gray Herbarium.

Plantago heterophylla Nuttall was described from Arkansas material which was without flowers or fruit. The plants were in a fine vegetative condition, showing well the fibrous roots, the mass of woolly hairs at the crown of the short caudex, long narrow herbaceous somewhat fleshy leaves with prominent scattered teeth. The spikes, flowers, and fruit were early described by Asa Gray in 1856 in his Manual, second edition. The extremes of the species are very unlike but they are connected by an innumerable number of intermediate forms. There are those so similar to depauperate forms of *P. pusilla* that they may be recognized only by the number and form and surface of the seeds. Others are so tall and erect and slight that they simulate *P. pusilla Engelmanni;* others so depressed-spreading and laciniate-toothed that they scarcely seem to be the same species. But the fruits and seeds run true.

Between 1880 and 1890, there was collected a series of plants of this species which were apparently new to the known California flora. They were from the environs of San Francisco Bay southward, here and there, to Tia Juana, Lower California, just over the international boundary. E. L. Greene described these as *P. californica*, in 1885. The vegetative characters of the Californian specimens vary as do (and parallel to) the southern and eastern forms. There is one difference in the fruiting stage, namely, the smaller number of seeds, often only five to eight, due very probably to incomplete fecundation of the ovules. It is highly significant, too, that the collections of this species in California seem to have ceased with the 1890's; especially significant, with such men as Heller, Abrams, Orcutt, Parish, and others in the field since that time. Under the data available, the present conclusion is that *P. heterophylla* Nuttall, 1837 (*P. californica* Greene, 1885), was for a few years adventive in California.

It is a pleasure gratefully to acknowledge the kindness and interest of officers of institutions, and others, who have offered or sent material for study; and duly to credit them under each species.

Key to species treated in this paper

[Biennials (normally). *P. virginica* group.]
Annuals, seeds pitted.
  Seeds 4, small, symmetrical.
    Pacific Slope native species. Bracts carnulose-keeled, pitted when dry.......................... *P. Bigelovii.*
    Central and Eastern native species. Bracts not pitted when dry.
      Campestrian, above 305 meters elevation (= ± 1000 ft.). Bracts saccate-keeled; seeds four times as long (2 mm.) as broad.. *P. elongata.*
      Mississippi drainage, Gulf region, Atlantic Slope and Coast, low elevations. Bracts not keeled, though somewhat swollen; seeds not more than three times as long as broad.
        Leaves usually entire; seeds about two and a half times as long (1 mm.) as broad. (Introduced and naturalized in Puget Sound region and tributaries.)............ *P. pusilla.*
        Leaves usually distantly laciniate-toothed; seeds about three times as long (1.8 mm.) as broad. (Known only from Indian Territory east to Missouri River.) *P. pusilla Engelmanni.*
  Seeds 10–30 (or fewer by abortion), minute, unsymmetrical.. *P. heterophylla.*

Plantago Bigelovii A. Gray, in Whipple, Pacif. R. R. Rep. **4**: 117. 1857; *descript. emend.* Bot. Calif. **1**: 612. 1876. Not *P. Bigelovii* S. Watson, Bot. King Exped. **5**: 212. 1871.

A low, erect, subcarneous, acaulescent annual. Roots one or two, with the secondaries fibrous, slender, numerous. Leaves basal, erect to ascending, more or less carnulose, glabrous to sparingly pubescent, several to many, sessile, linear to linear-filiform, scarious-expanded at the base, entire, obtusely (callous-) tipped, obscurely 1–3-nerved, 3–10 cm. × 1–4 mm. Scapes basal and axillary, erect, slightly to twice surpassing the leaves, terete, a little thickened at the summit, appressed-pubescent, one to ten (even fifteen ?), 5–15 cm. tall. Spikes cylindrical, with the flowers more or less imbricate, few- to thirty-flowered. Bracts closely subtending the flowers, about equaling the calyx, carnulose-keeled and saccate, broadly ovate, margins scarious and as wide as the herbaceous center, obtuse, 2.5 mm. × 3 mm. The flowers inconstantly dimorpho-subdioecious. Calyx glabrous, its divisions scarious, with slightly herbaceous midribs, obovate, rounded, 2 mm. × 1.5 mm. Corolla minute, just exceeding the capsule, its lobes spreading, often not closing in fruit, scarious, with darker midrib, lanceolate-triangular, acute. Stamens two, little if at all exserted. Pyxis one third longer than the calyx, oblong-ovoid, abruptly rounded, circumscissile just below the middle. Seeds four to six, black, rough, oblong, 1.5 mm. × 0.5 mm.

Type specimen is Bigelow's collection, April 23, 1854, from Benicia, California, in the Gray Herbarium.

Sixty-one sheets or specimens from British Columbia, Washington, and California have been examined, in herbaria as follows: 6, Geological and Natural History Survey of Canada; 9, Columbia University and New York Botanical Garden; 4, Field Museum of Natural History; 12, Gray Herbarium; 6, Doctor Edward Lee Greene; 7, Missouri Botanical Garden; 3, Academy of Natural Sciences of Philadelphia; 10, United States National Herbarium; 1, University of Pennsylvania; and 3, my own herbarium.

PLANTAGO ELONGATA Pursh, Fl. Am. Sept. **2**: 729. 1814

P. pusilla Decaisne, *pro parte*, in DC. Prod. **13'**: 696. 1852.

P. Bigelovii S. Watson, Bot. King Exped. **5**: 212. 1871. Not A. Gray, in Whipple, Pacif. R. R. Rep. **4**: 117. 1857.

P. pusilla var. *macrosperma* Engelmann, Bot. Gaz. **8**: 175. 1883. Not *P. macrosperma* Steudel, Flora **32**: 405. 1849.

P. pusilla A. Gray, *pro parte*, Syn. Fl. **2**^{1}: 392. 1886. Not Nuttall, Gen. N. Am. Pl. **1**: 100. 1818.

P. elongata Auct. Am. plur., *pro parte*.

P. myosuroides Rydberg, Mem. N. Y. Bot. Gard. **1**: 369. 1900.

A relatively low, erect, rather coarse, acaulescent annual, of subsaline and saline situations, noticeably cinereous-pubescent in its lower half, with the general habit of being erect, usually higher than wide, and with the oldest scapes becoming decumbent with age. Root normally one, long, stout, woody, and large in proportion to the plant; secondaries few, filiform, and shorter than the primary. Leaves basal, erect or slightly spreading, sometimes with tips recurved, one half to three fourths as high as the plant, herbaceous or slightly fleshy in larger forms, strongly cinereous-pubescent for the lower half, few to numerous, gradually expanded into the semi-clasping base (two to four times as long as wide), linear, entire or remotely callous-denticulate, callous-tipped even when long-acuminate, 1-nerved, 3–10 cm. × 0.5–2 mm. Peduncles axillary, erect, or the oldest bowed outward from the crown, equaling or shorter than the leaves, rarely longer, terete, not striated, or but slightly so below the spike, one to many, 3–8 cm. high. Spike erect, cylindrical, slender, with the flowers often distant, 1–10 cm. long. Bracts closely subtending the flowers, rather uniformly ascending, about equaling the calyx, herbaceous-carnose, distantly spur-keeled to 0.5 mm. below basal attachment and 0.5 mm. divergent from peduncle, triangular-ovate, scarious, with margins one third as wide as the herbaceous center, entire, acute or acutish, 2 mm. (from spur to apex) × 1.5 mm. Flowers subperfect. Calyx glabrous, inequilateral, its divisions obovate, scarious margins wider than the distinctly herbaceous midrib, apex truncate-rounded, about the width of the bract, 1.75 mm. long. Corolla very minute, rarely closing to form a beak, throat as long as the lobes, the lobes triangular, entire, acute, 0.5 mm. × 0.25 mm. Stamens two, included. Pyxis glabrous, twice surpassing the calyx, oblong-ovate, truncate-rounded, with the base of style persistent as a distinct tubercle, circumscissile just below the middle, 2.5–3 mm. × 1.5 mm. Seeds four, finely rugose-pitted, dark seal-brown, elliptical, 2 mm. × 0.5 mm.

Type specimen is Bradbury's collection from "Upper Louisiana," in the herbarium of the Academy of Natural Sciences of Philadelphia.

Thirty-seven sheets or specimens from Assiniboia, North Dakota, South Dakota, Nebraska, Oklahoma, Montana, Colorado, and Utah, have been examined, in herbaria as follows: 5, Geological and Natural History Survey of Canada; 6, Columbia University and New York Botanical Garden; 5, Gray Herbarium; 1, Doctor Edward Lee Greene; 8, Missouri Botanical Garden; 2, Academy of Natural Sciences of Philadelphia; 5, United States National Herbarium; 5, University of Nebraska.

PLANTAGO PUSILLA Nuttall, Gen. N. Am. Pl. **1**: 100. 1818

P. maritima Barton, Prod. Fl. Phila. 26. 1815. Not Linnaeus, Sp. Pl. 114. 1753.

P. hybrida Barton, Comp. Fl. Phila. **2**: 214. 1818; Fl. N. Am. **3**: 77. *pl. 98. f. 1.* 1823.

P. linearifolia Muhlenberg (?), Cat. ed. 2, 15. 1818, *nomen nudum.* —Torrey, Fl. U. S. 185. 1824, *cit. excl.**

P. pusilla Decaisne, *pro parte*, in DC. Prod. **13^1**: 696. 1852.

P. elongata Auct. Am. plur. Not Pursh, Fl. Am. Sept. **2**: 729. 1814.

An inconspicuous, very low acaulescent annual, of sandy or dry situations, occasionally intruding upon woodlands, mostly glabrous or with slight pubescence about the crown. Roots one or two, normally short, small in proportion to the plant, weak, the secondaries numerous, filiform-fibrous, and usually longer than the primaries. Leaves basal, erect or somewhat spreading, one fourth to one half as high as the plant or even shorter in depauperate individuals, herbaceous or slightly fleshy, 4 or 5 to numerous, abruptly expanded into the semi-clasping base (a little longer than broad), filiform to linear, sometimes narrowed below, entire or rarely remotely callous-denticulate, apex callous, blunted or sometimes acutish, 1-nerved or in wider forms obscurely 3-nerved, the outer nerves being about equidistant from midrib and margin, 1–5 cm. × 0.5–2 mm. Peduncles axillary, erect to spreading-ascending, four times as long as, to a little shorter than, the leaves, terete, becoming striate when dry especially near the base of the spike, 1 to many (160 counted on one individual from Long Island), 3–10 cm. high. Spikes erect, cylindrical, slender, with flowers at first imbricate, at length even much scattered. Bracts closely subtending the flowers, at first erect, later spreading by the expanding fruit, equaling the calyx, surpassing it in etiolated forms, herbaceous, carnulose, tending to subsaccate dorsally, triangular-ovate, scarious, with margins one half as wide as the herbaceous center, entire, rounded-obtuse or blunt, 1.5–2 mm. × 1.25–1.5 mm. Flowers subperfect. Calyx glabrous, inequilateral, its divisions obovate, with scarious margins wider than the

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*Torrey, *loc. cit.*, gives "Muhl. Cat. p. 15 ?." Torrey later, and many others, give "Muhl. Cat. p. 15 ? ex Torr. Fl. U. St. 185." This citation, by its form, naturally refers to Muhl. Cat. ed. 1, Lancaster, 1813. The Plantaginaceae are listed on page 16; and *P. linearifolia* is not included in the list. Torrey did specify the second edition of Muhlenberg's Catalogue in his bibliography at the beginning of his Flora, but it must have been constantly overlooked. Accordingly, Torrey's citation, and those following it, must be considered incomplete and misleading.

distinctly herbaceous midrib, apex rounded or bluntly apiculate by the excurrent midrib, less than the width of the bract. Corolla very minute, forming an incompletely closed beak above a hardly discernible throat; its lobes triangular, entire, acute, 0.5 mm. × 0.25 mm. Stamens two, included. Pyxis one third surpassing the calyx or little more, glabrous, ovate--ovoid, truncate-rounded or with the base of the style persistent in the slightly depressed apex, circumscissile just above the lower third, 1.75 mm. × 1 mm. Seeds 4, coarsely rugose-pitted, dark olive-brown, elliptical-oblong, 1.25 mm. × 0.5 mm.

Woodland forms intergrade with the following subspecies.

Type specimen is Nuttall's collection, from "Arkansas," in the herbarium of the Academy of Natural Sciences of Philadelphia.

One hundred and seventy-four sheets or specimens from Massachusetts, Rhode Island, Connecticut, New York (Long Island), New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia, Virginia, South Carolina, Georgia, Florida (?), Illinois, Kentucky, Tennessee, Alabama, Missouri, Arkansas, Kansas, Indian Territory, and Texas; and (introduced) in Washington, Oregon, and California, have been examined, in herbaria as follows: 2, Brooklyn Institute Museum; 28, Columbia University and New York Botanical Garden; 14, Field Museum of Natural History; 16, Gray Herbarium; 6, Doctor Edward Lee Greene; 47, Missouri Botanical Garden; 22, Academy of Natural Sciences of Philadelphia; 7, Mr. Wilhelm N. Suksdorf; 21, United States National Herbarium; 1, University of Nebraska; 6, University of Pennsylvania; and 4, my own herbarium.

Plantago pusilla Engelmanni nom. nov.

P. pusilla var. *major* Engelmann, Bot. Gaz. **8**: 175. 1883. Not *P. major* Linnaeus, Sp. Pl. 112. 1753.

A rather large annual, varying in height to 25 cm., about twice the dimensions of *P. pusilla* when at the same stage of development, noticeably herbaceous, densely woolly at the base. Root usually one, secondaries about the length of the primary, numerous, filiform, fibrous, the crown densely pubescent or even woolly among the leaf-bases. Leaves basal, erect or strict-ascending, glabrous to cinereous-pubescent, numerous, with petiole distinguishable from the lanceolate-linear blade, attenuate at both ends, in maturity with few prominent scattered callous teeth which are either straight or falciform, acute except for the callous tip, 1–3-nerved, 4–12 cm. × 1–4 mm. Peduncles axillary, erect to strict-ascending, much surpassing the leaves, terete below, channeled above, cinereous above, densely woolly below, numerous, 5–25 cm. high. Spikes erect, thin, with the flowers scattered or in false pairs and clusters. Bracts closely subtending the flowers, erect or nearly so, typically one half surpassing the calyx, herbaceous, saccate, triangular-lanceolate, margins narrowly scarious, apex strictly acute, about 2.5 mm. long. Flowers apparently perfect. Calyx glabrous, its divisions inequilateral, with the scarious margins distinctly wider than the herbaceous midrib, apex obtuse, equaling the width of the bract. Corolla very minute, forming incompletely closed beak, with throat short, its lobes triangular, entire, acute, about 0.5 mm. long. Stamens 2, included. Pyxis more than one third surpassing calyx, ovoid-oblong, obtusish, circumscissile at about the lower third. Seeds four, obscurely pitted, very dark brown, oblong, 1.8 mm. (or a little less) × 0.33 mm.

This subspecies intergrades strongly with woodland or otherwise sheltered individuals of the typical form.

Type specimen is G. D. Butler's collection from near Atoka, Indian Territory, in the Missouri Botanical Garden, Engelmann Herbarium.

Ten sheets or specimens from Indian Territory and Missouri have been examined, in herbaria as follows: 4, Gray Herbarium; 4, Missouri Botanical Garden; 2, New York Botanical Garden.

PLANTAGO HETEROPHYLLA Nuttall, Trans. Am. Phil. Soc. II. **5**: 177. 1837

P. caroliniana Pursh (?), Fl. Am. Sept. **1**: 98. 1814. Not Walter, Fl. Carol. 85. 1788.

P. pusilla Decaisne, *pro parte*, DC. Prod. **13**^{1}: 696. 1852. Not Nuttall, Gen. **1**: 100. 1818.

P. perpusilla Decaisne, in DC. Prod. **13**^{1}: 697. 1852.

P. californica Greene, Bull. Calif. Acad. I. **3**: 123. 1885. Not *P. Durvillei* var. *californica* Fischer & Meyer, Ind. Sem. Petrop. 1839–40.

A very variable, low, erect or spreading, herbaceous, glabrous, or partly woolly-pubescent annual. Roots one or two, often very short; secondaries fibrous, slender, usually very numerous. Leaves basal, erect or spreading, herbaceous, usually very thin, few to many, blade and petiole indistinguishable or very gradually expanded below, linear, narrow, acute or rarely blunt, 1–3-nerved, 3–12 cm. × 0.75–2.5 mm., entire to toothed, the straight or curved teeth sometimes 1 cm. long. Peduncles axillary, erect to spreading, terete, slender, glabrous, or often woolly at the base, few to many, 4–15 cm. high. Spikes racemiform, often much and irregularly interrupted, 10–30- or more-flowered. Bracts usually conspicuous, twice surpassing to equaling the calyx in fruit, closely involving the calyx, herbaceous, with scarious margins at the lower half (half as wide as the herbaceous center), triangular, ovate, entire, blunt or obtusish at the apex, 2 mm. × 1.5 mm. when mature. Flowers normally perfect. Calyx glabrous, equilateral or slightly inequilateral, its divisions ovate, with wide scarious margins and narrow prominent green midrib, ovate, blunt, about the width of the bract. Corolla minute, with hardly distinguishable throat, its lobes erect over the fruit, triangular, entire, acute, 0.25 mm. × 0.10–0.15 mm. Stamens two, included. Style slender, exserted, about 1 mm. long, at length its base persistent as a distinct tubercle. Pyxis fusiform-ovoid, circumscissile just below the middle, 2.5–3 mm. × 2 mm. Seeds 10–25 or more, or by abortion fewer, irregular by mutual pressure, blackish brown, oblong, 0.75 mm. × 0.35–0.40 mm.

Type specimen is Nuttall's collection, from Arkansas, in the herbarium of the Academy of Natural Sciences of Philadelphia.

One hundred and ninety-five sheets or specimens from New Jersey, Pennsylvania, Delaware (?), Maryland, North Carolina, South Carolina, Georgia, Florida, Illinois, Kentucky, Tennessee, Alabama, Mississippi, Missouri, Arkansas, Louisiana, Texas, and (introduced) in California and Lower California, have been examined, in herbaria as follows: 3, President Ezra Brainerd; 2, Brooklyn Institute Museum; 38, Columbia University and New York Botanical Garden; 15, Field Museum of Natural History; 32, Gray Herbarium; 7, Doctor Edward Lee Greene; 45, Missouri Botanical Garden; 22, Academy of Natural Sciences of Philadelphia; 1, Mr. Wilhelm N. Suksdorf; 20, United States National Herbarium; 7, University of Pennsylvania; and 3, my own herbarium.

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